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**Paper and board — Determination  
of moisture content of a lot — Oven-  
drying method**

*Papier et carton — Détermination de la teneur en humidité d'un lot  
— Méthode par séchage à l'étuve*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

This fourth edition cancels and replaces the third edition (ISO 287:2009), which has been technically revised.

The main changes compared to the previous edition are as follows:

- precision data (previously in [Clause 11](#)) have been moved to [Annex A](#);
- editorial changes have been made for clarification and removal of inconsistencies.

## Introduction

The determination of dry matter content and moisture content are carried out for different purposes.

ISO 638 is used in cases where the dry matter content is needed to calculate the result of chemical analysis or physical testing and when the determination of the moisture content of a sample, rather than a lot, is required. As an example, the dry matter content of the sample is needed to express the content of elements, such as cadmium and manganese, in relation to the oven-dry mass of the sample.

This document is used for the purpose of determining the average moisture content and the variation in moisture content (maximum and minimum values) of a lot. In the paper and board trade, the moisture content is important since it influences converting processes, such as printing and copying. The moisture content also has an influence on curl and dimensional stability.

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# Paper and board — Determination of moisture content of a lot — Oven-drying method

## 1 Scope

This document specifies an oven-drying method for the determination of the moisture content of a lot of paper and board. The procedure in [Clause 8](#), describing how the test pieces are drawn from the lot, is performed at the time of sampling.

This document is applicable to every type of lot of paper and board, including corrugated board and solid board, provided that the paper or board does not contain any substances, other than water, that are volatile at the temperature specified in this document.

NOTE For determination of the dry matter content of a sample of paper or board, e.g. for calculation of the dry mass of the sample, ISO 638<sup>[1]</sup> can be used.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 186, *Paper and board — Sampling to determine average quality*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1 moisture content

$w_{\text{H}_2\text{O}}$

content of water in paper or board, i.e. the ratio of the loss of mass of a test piece, when dried under specified conditions, to its mass at the time of sampling

Note 1 to entry: The moisture content is normally expressed as a percentage mass fraction.

### 3.2 constant mass

mass reached by a test piece of paper or board after drying at a temperature of  $(105 \pm 2)$  °C until the difference between two successive dryings and weighings, separated in time by at least half the initial drying period, does not exceed 0,1 % of the initial mass of the test piece at the time of sampling

## 4 Principle

At the time of sampling, test pieces taken from a lot are weighed and the test pieces are weighed again after drying to constant mass. From the mass of a test piece before and after drying, the moisture content is calculated.

## 5 Apparatus

**5.1 Balance**, having an accuracy of 0,05 % of the mass to be weighed, or better.

**5.2 Containers**, for the transport and weighing of test pieces, which shall be water-vapour proof and made from a lightweight material that is not subject to change under the conditions of test.

**5.3 Oven**, capable of maintaining the air temperature at  $(105 \pm 2)$  °C, and suitably ventilated to maintain a uniform temperature in the usable volume while extracting the moisture driven off the test pieces.

**5.4 Desiccator**.

## 6 Preparation of containers

Before sampling, number a sufficient number of clean, dry containers (5.2). Allow the containers to attain temperature equilibrium with the atmosphere. Use a balance (5.1) and weigh each container. Keep the containers closed until the sample is about to be taken.

## 7 Sampling

Select the units to be sampled in accordance with ISO 186.

Precautions shall be taken when handling the paper or board to avoid contamination and any gain or loss of moisture if the atmosphere at the place of sampling is warm and damp. It is recommended to wear plastic or rubber gloves. To avoid moisture changes due to atmospheric exposure, it is important to enclose all test pieces in their containers immediately after taking them.

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## 8 Selection, preparation and weighing of test pieces

### 8.1 General

For each unit withdrawn from the lot, proceed as specified in 8.2 or 8.3. Report the procedure that was used (for selection, preparation and weighing) along with other reported results (as described in Clause 11).

### 8.2 If the unit is a package that can be and may be unwrapped, or is in an unwrapped form

#### 8.2.1 When the unit is not subdivided and not a reel

##### 8.2.1.1 Average moisture content, grammage < 225 g/m<sup>2</sup>

Discard the three outermost sheets and all damaged sheets. The number of layers discarded may need to be increased according to the efficiency of wrapping and the influence of storage conditions. Take at least four consecutive sheets; quickly fold or cut them and enclose them together in one of the containers. The contents of a container constitute a test piece, which shall have a mass of at least 50 g. Weigh the container with its contents and calculate the mass of the test piece at the time of sampling,  $m_0$ .

Prepare duplicate test pieces for each unit sampled.

Where the bulk of a 50 g test piece is very large, as for instance for very lightweight papers, a smaller mass of at least 25 g may be used. If a smaller mass is used, state this mass in the test report.



### 8.2.1.2 Average moisture content, grammage $\geq 225$ g/m<sup>2</sup>

Discard the three outermost sheets and all damaged sheets. The number of layers discarded may need to be increased according to the efficiency of wrapping and influence of storage conditions. Take one or more sheets to provide sufficient strips, of width 50 mm to 75 mm and length not less than 150 mm, to give a total mass of at least 50 g. The strips constitute the test piece. Immediately enclose the test piece in one of the containers. Weigh the container with its contents and calculate the mass of the test piece at the time of sampling,  $m_0$ .

Prepare duplicate test pieces for each unit sampled.

### 8.2.1.3 Variation in moisture content of the sheets

For the determination of the variation between the centre and edges of the sheets, select a layer of sheets in accordance with [8.2.1.1](#) or [8.2.1.2](#). The layer of sheets shall have dimensions of  $\geq 450$  mm in cross-direction, and  $\geq 200$  mm in the MD. Take sufficient consecutive sheets to give one edge test piece and one centre test piece, as described below, each having a mass of at least 50 g.

From the selected layer of sheets, cut four sets of strips of width 50 mm to 75 mm, one strip from each edge and two strips near the centre, as shown in [Figure 1](#), taking care not to separate either the sheets or the strips comprising a set. Cut the strips with their longer dimension in the cross-direction with a length of at least 150 mm. Trim the ends of the strips to remove any paper or board within 150 mm of the edge of the original layer of sheets.

NOTE This direction of cut is chosen because any moisture variation across the width of the machine remaining in the paper from the papermaking operation will then be equally represented on each strip.

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